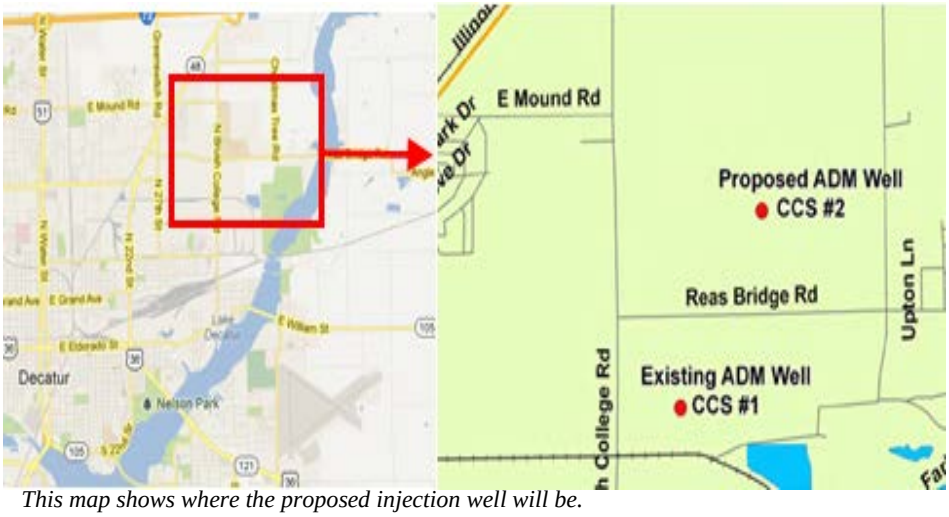
United States
Environmental Protection
Agency

Public Comments Sought on Carbon Storage Draft Permit

Archer Daniels Midland Co. Carbon Storage Well
Decatur, Illinois April 2014



This map shows where the proposed injection well will be.

The U.S. Environmental Protection Agency is accepting comments from the public (*see box, left*) on its intent to issue a permit for the Archer Daniels Midland Co. to inject and store carbon dioxide, or CO_2, underground at its Decatur facility. The process is called "carbon capture and storage," or "carbon sequestration."

CO_2 is a greenhouse gas that contributes to climate change. Carbon sequestration is a means of reducing greenhouse gas emissions.

CO_2 is created when ADM makes ethanol. In carbon capture and storage, the CO_2 is captured before it goes into the air. It is then put under high pressure and turned into a liquid so it can be injected deep into the ground through wells.

ADM selected the well location after a long period of scientific research and planning. This is to make sure the well is going to work as planned according to local geography and geology.

ADM has an existing well and plans a new well for CO_2 injection. ADM plans several other wells that will help the company monitor the main wells over time. Scientists will study the CO_2 injection process and, after the injection ends, the storage site to make sure the CO_2 remains in place. This information will be used to help similar projects in other places.

The first well, CCS #1, is already working. It is receiving 1 million metric tons of CO_2 over three years. CCS#1 is operating under a permit issued by Illinois EPA. The second well, CCS #2, has not yet been drilled. ADM plans to inject 1.1.million metric tons of CO_2 per year into this well over five years. Sequestering 1.1 million metric tons of carbon dioxide each year is the equivalent of eliminating carbon emissions from 232,000 cars.

You're invited

The EPA will hold an open house and a formal public hearing on the ADM draft permit at: Decatur Public Library, 130 N. Franklin Street

May 21, 2014
Open House and Q&A,
11 a.m. – 1 p.m. and 5 – 7 p.m.

Public Hearing, 7 – 9 p.m.
Oral and written comments will be recorded or accepted. EPA will provide a summary of its proposed decision but will not answer questions during the hearing.

How to comment

In addition to accepting comments at the public hearing, EPA will accept written comments from April 16 until May 30, 2014. Comments can be sent to Allan Batka or submitted online at the web page below

Allan Batka
U.S. EPA
UIC Branch (WU-16J)
77 W. Jackson Blvd.
Chicago, IL 60604-3590

Web resources

www.epa.gov/region5/water/uic/adm/

You may call EPA toll-free at 800-621-8437, 8:30 a.m. – 4:30 p.m., weekdays.

How did EPA make its decision?

In reviewing ADM's permit application, EPA evaluated technical information and project-specific data, such as:

- Advanced computational modeling to determine the proposed project area.
- The rock layers through which the proposed injection well would be drilled, to confirm that the CO_2 will stay where it is injected.
- The location of drinking water resources near the project and how they will be protected.
- The proposed well construction design.
- The characteristics of the CO_2 to be injected.
- The proposed approach and technologies ADM will use to operate and monitor the project during and after injection.
- The financial resources ADM will have available to responsibly operate, monitor and close the project.
- ADM's approach to ensure that the project will protect underground sources of drinking water, public health and the environment.

What happens next in the permit process?

EPA will review all public comments before making a final decision on whether or not to grant the permit. The Agency will respond to all comments on the draft permit.

If EPA decides to issue the final permit, ADM would be free to drill the proposed CCS #2.

Information Repository

The draft permit and fact sheet are available at:

Decatur Public Library
130 N. Franklin St.

Administrative Record

The full administrative record, including all data submitted by Archer Daniels Midland Co. in support of its permit application, is available for public review at EPA's Chicago regional office. The office is open 8:30 a.m. – 4:30 p.m., weekdays. To review the administrative record or for additional information please contact Allan Batka at 312-353-7316 or batka.allan@epa.gov.

On the Web

For more information about the ADM project:
www.epa.gov/region5/water/uic/adm

Legal Notice

To preserve your right to appeal any final permit decision, you must either participate in the public hearing or send in written comments on the draft permit decision by the end of the comment period.

The first appeal must be made to the Environmental Appeals Board; only after all agency review procedures have been exhausted may you file an action in the appropriate Circuit Court of Appeals.

Technical background and details of ADM's carbon storage project

The EPA's review of ADM's permit application indicates no significant environmental impact should result from the proposed injection, so EPA intends to issue a permit for this well.

Title 40 of the Code of Federal Regulations Parts 144 and 146, require EPA permits for carbon storage, known as Class VI permits, to specify conditions for the construction, operation, monitoring, reporting, plugging, post-injection site care and site closure of Class VI injection wells to prevent the movement of fluids into any underground source of drinking water, or USDW. See 40 CFR Parts 144 and 146 for the general provisions of underground injection permits.

In accordance with 40 CFR 124.8, below is information and highlighted permit conditions for the well.

Area of Review and Corrective Action: In accordance with 40 CFR 146.84, the Area of Review, or AoR, is the area surrounding the injection well where any improperly sealed, completed or abandoned wells that penetrate the confining zone could provide a conduit for fluid migration. The AoR for this well has a radius of approximately two miles and was delineated pursuant to 40 CFR 146.84(c)(1) using a model that predicts the movement of the CO_2 plume and pressure front based on available information about planned injection operations and the subsurface rock formations. See the figure on the sixth page.

Based on a search of well records, there are two wells within the AoR that penetrate the confining zone. Both belong to ADM – CCS#1 and Verification Well #1 – and were properly constructed.

As required at 40 CFR 146.84(e), ADM will re-evaluate the AoR by re-running the models at least every five years over the life of the project to verify, based on monitoring and operating data, that the CO_2 plume and pressure front are moving as predicted. If there are any changes from predictions, ADM must revise the project-specific plans described here and EPA will modify the permit per 40 CFR 144.39.

Underground Sources of Drinking Water: USDWs are defined by UIC regulations as aquifers or portions thereof which contain less than 10,000 milligrams per liter of total dissolved solids and are being used, or could be used, as a source of drinking water. The base of the lowermost possible USDW in the vicinity of the injection well, the St. Peter Sandstone formation, is approximately 2,604 feet below the ground surface.

Injection and Confining Zone: Injection is limited by the permit to the Mount Simon formation between 5,545 feet and 7,051 feet below ground. This zone is separated from the lowest USDW by approximately 2,941 feet of rock, including an impermeable confining zone that will act as barrier to fluid movement. EPA has reviewed company information, including maps, well logs, cores and the results of seismic surveys, and determined that the regional and local geologic features at the site will allow the Mount Simon formation to receive the amounts proposed to be injected without fracturing and that the confining zone will provide a suitable trap so that the CO_2 will remain in place and USDWs will not be endangered, as required under 40 CFR 146.83.

Construction Requirements: The proposed construction of the injection well meets the regulatory criteria of 40 CFR 146.86. All Class VI wells must be constructed with materials and cements that can withstand exposure to $CO_2$and CO_2/water mixtures without excessive corrosion over the life of the project. Class VI wells must also be cased and cemented to prevent the movement of fluids into or between USDWs. This well will be equipped with an automatic surface shut-off device that will shut off the well if any permitted operating parameters – such as injection pressure – diverge from permit limitations. ADM may not commence construction, including drilling, of any new well until a final permit has been issued and is effective.

Injection Fluid: The permit limits injected fluid to 99 percent pure CO_2. The source is ADM's biofuel production facility. The expected maximum daily amount of fluid to be injected is 3,000 metric tons. ADM anticipates injecting a total of 5,500,000 metric tons of CO_2 over five years.

Maximum Injection Pressure: The maximum injection pressure will be limited to 2,380 pounds per square inch gauge (psig) to ensure that the pressure during injection does not initiate fractures in the injection or confining zones, pursuant to 40 CFR 146.88(a). This in turn ensures that the injection pressure will not cause the movement of injection or formation fluids into a USDW as prohibited by 40 CFR 146.86(a).

Monitoring and Reporting Requirements: In accordance with 40 CFR 146.90, ADM will implement an approved Testing and Monitoring Plan. The company will analyze the CO_2 monthly to provide information about its chemical and physical characteristics. ADM will also be required to demonstrate well integrity before injection begins and throughout injection operations. ADM must conduct and pass a two-part mechanical integrity test, in accordance with 40 CFR 146.8 and 146.89, before EPA will authorize ADM to inject. After injection begins, ADM will continuously

observe and record injection pressure, flow rate and volume and the pressure on the annulus to detect leaks in the casing, tubing or packer. In addition, ADM must demonstrate external mechanical integrity using a temperature or noise log or another approved method, every year to detect fluid movement behind the casing. ADM will test the well for signs of corrosion every quarter to provide early warning of well material corrosion due to contact with CO_2 in the presence of water that could compromise the well.

ADM will also monitor the environment near the well to verify that the project and the injected CO_2 are behaving as predicted. ADM must perform groundwater quality monitoring in shallow wells quarterly in the first years of the project and every 6 months later in the project, and monitor ground water quality in deeper wells annually to detect geochemical changes that may be a result of changes – such as leaching or mobilization of heavy metals and organic compounds or fluid displacement – that could impact USDWs. Pressure fall-off testing will be performed half-way through and at the end of injection to verify that the injection zone is responding to injection as predicted. ADM will also track the movement of the CO_2 plume and pressure front using direct methods (e.g., fluid sampling and pressure/temperature monitoring) and indirect methods (e.g., seismic surveys) to verify that the CO_2 plume and pressure front are moving as predicted or to provide early warning if they are not.

In accordance with 40 CFR 144.54 and 146.91, ADM will submit results of this monitoring to the EPA semiannually or within 30 days of the completion of a mechanical integrity test or other required testing.

Emergency and Remedial Response: In accordance with 40 CFR 146.94, ADM developed a site-specific Emergency and Remedial Response Plan that identifies the resources that may be at risk due to the injection activities, including USDWs; drinking water wells; the Sangamon River; Bois Du Sangamon Nature Preserve; and Lake Decatur; and infrastructure, including the wellhead, ADM facilities, and Richland Community College. The Plan, an enforceable part of the permit, also describes the responses that would be taken to address adverse events, and the staff and equipment available to support this and other such activities. The Emergency and Remedial Response provisions of the permit will facilitate expedient responses and prevent or mitigate harm to the environment, including USDWs.

Financial Responsibility: In accordance with 40 CFR 146.85, ADM has demonstrated, and will maintain, adequate financial responsibility to perform all needed corrective action on wells in the AoR, to plug the injection well, to perform all required post-injection site care and close the site, and to conduct any needed emergency and remedial response measures. ADM will use a corporate guarantee to cover these costs and demonstrate financial responsibility. The cost estimates must be updated within 60 days prior to the anniversary date of the establishment of the financial instruments. This ensures resources are available to perform these USDW-protective activities without using public/taxpayer money.

Plugging and Abandonment: In accordance with 40 CFR 146.92, the permit includes an Injection Well Plugging Plan for environmentally protective well closure at the cessation of injection operations. The well will be plugged using approved materials that are compatible with CO_2/water mixtures to ensure the well will not serve as a conduit for fluid movement.

Post-Injection Site Care and Site Closure: In accordance with 40 CFR 146.93, ADM must implement an approved Post-Injection Site Care and Site Closure Plan. Following the cessation of injection, the company must continue to monitor groundwater quality, track the movement of the CO_2 plume and pressure front in a manner similar to that described under "Monitoring and Reporting Requirements" above. This monitoring will help confirm predictions about the behavior of the CO_2 plume and pressure front (i.e., that pressures should subside after injection ceases) and provide early warning of USDW endangerment. ADM will continue this post-injection monitoring for at least ten (10) years and until they can demonstrate based on monitoring and other site data that the site does not pose a risk to USDWs and that site closure may be authorized. Following authorization of site closure, ADM will plug all monitoring wells with CO_2-compatible materials to ensure they cannot serve as conduits for fluid movement and will restore the site to its original condition by removing all equipment and planting vegetation.

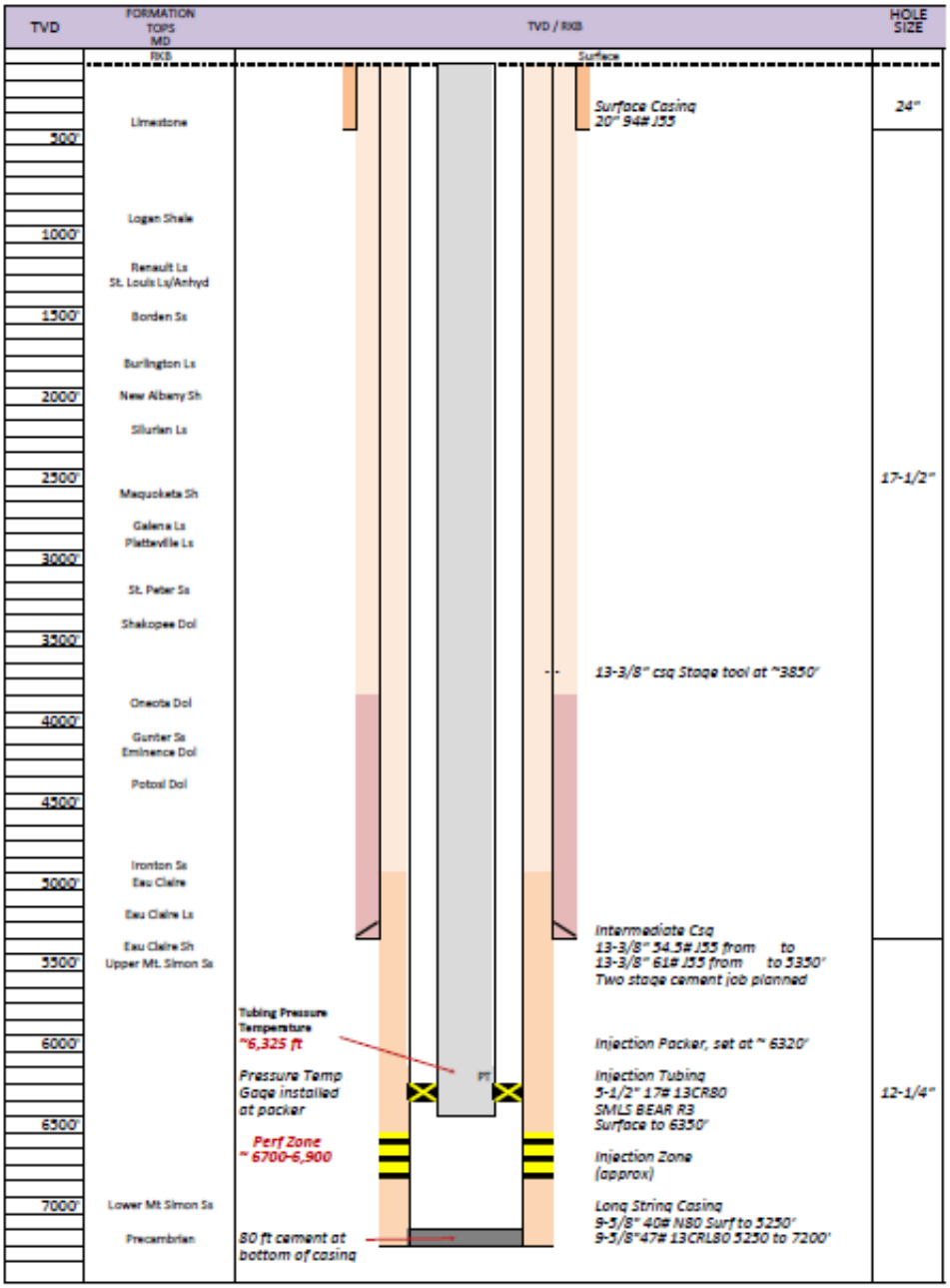
Issuance and Effective Date of Permit: In accordance with 40 CFR 124.15, the permit will become effective immediately upon issuance if no public comments were received that requested a change in the draft permit. However, in the event that public comments are received that requested a change in the draft permit then the permit will become effective 45 days after the date of issuance unless the permit is appealed.

In accordance with 40 CFR 144.36(a), the permit will be in effect for the life of the project unless it is otherwise modified, revoked and reissued, or terminated as provided at 40 CFR 144.39, 144.40 and 144.41. The permit will expire in one year if ADM fails to commence construction, unless a written request for an extension of this one year period has been approved by EPA. Authorization to inject under this permit will be granted following well construction and compliance with additional requirements as outlined in the permit and regulations at 40 CFR 146.82, 146.86, 146.87 and 146.89.

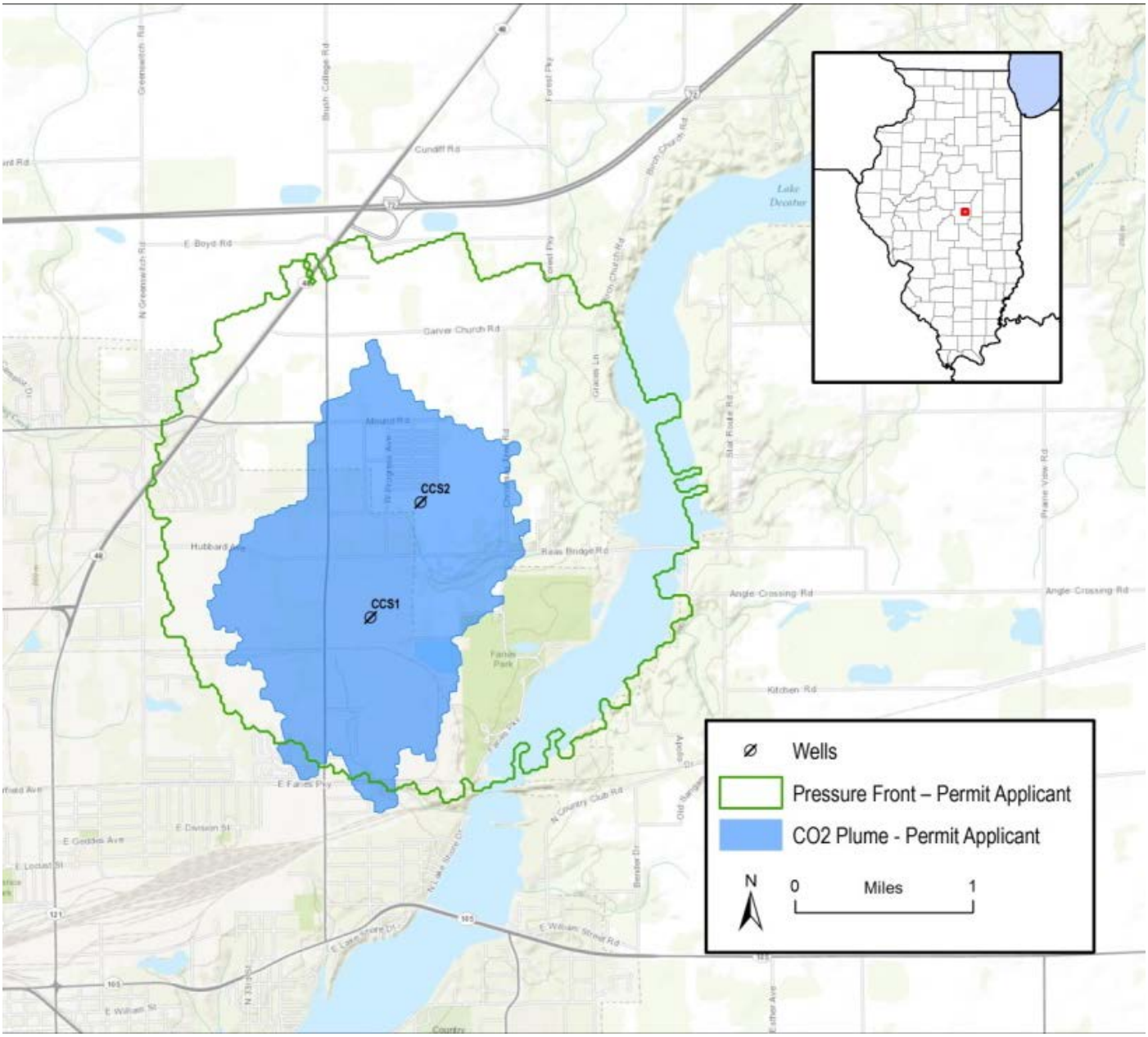
IL-ICCS CCS#2 Well Schematic

(depths are reference to the Kelley bushing = 694 ft above MSL)

KB = 17 ft above ground, site elevation = 677 ft above MSL



Injection Well Schematic



Area of Review: CO_2 Plume and Pressure Front